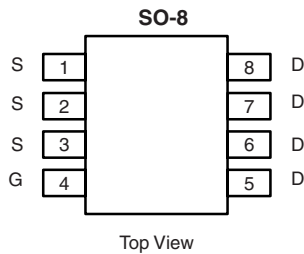


## N-Channel 30-V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
30	0.0095 at $V_{GS} = 10$ V	13
	0.0105 at $V_{GS} = 4.5$ V	12

SCHOTTKY PRODUCT SUMMARY		
$V_{DS}$ (V)	$V_{SD}$ (V) Diode Forward Voltage	$I_F$ (A)
30	0.53 V at 3.0 A	3.0



**Ordering Information:** Si4736DY-T1-E3 (Lead (Pb)-free)  
Si4736DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

### FEATURES

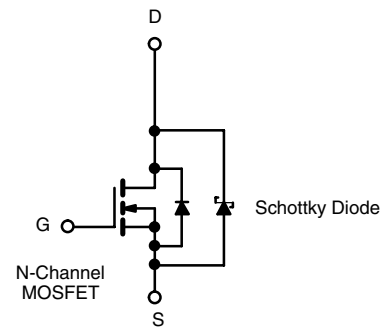
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET<sup>®</sup> Power MOSFET
- LITTLE FOOT<sup>®</sup> Plus Schottky
- Shoot-Thru-Free
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

### APPLICATIONS

- DC/DC Converters Optimized for "Low-Side" Synchronous Rectifier Operation



ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	10 s	Steady State	Unit
Drain-Source Voltage	$V_{DS}$	30		V
Gate-Source Voltage	$V_{GS}$	$\pm 12$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	$T_A = 25$ °C	13	A
		$T_A = 70$ °C	10	
Pulsed Drain Current	$I_{DM}$	50		A
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	5	3.0	
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25$ °C	3.1	W
		$T_A = 70$ °C	2.0	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150		°C

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typ.	Max.	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	$t \leq 10$ s	33	40	°C/W
		Steady State	70	85	
Maximum Junction-to-Foot (Drain)	$R_{thJF}$	17	21		

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

This data sheet contains preliminary specifications that are subject to change.

MOSFET SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.8	1.35	1.9	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 12\ \text{V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\ \text{V}, V_{GS} = 0\ \text{V}$		0.007	0.100	mA
		$V_{DS} = 30\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 100\text{ }^\circ\text{C}$		1.5	10	
		$V_{DS} = 30\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 125\text{ }^\circ\text{C}$		6.5	20	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} \geq 5\ \text{V}, V_{GS} = 10\ \text{V}$	20			A
Drain-Source On-State Resistance <sup>b</sup>	$R_{DS(on)}$	$V_{GS} = 10\ \text{V}, I_D = 13\ \text{A}$		0.0070	0.0095	$\Omega$
		$V_{GS} = 4.5\ \text{V}, I_D = 12\ \text{A}$		0.0083	0.0105	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\ \text{V}, I_D = 13\ \text{A}$		56		S
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_S = 3.0\ \text{A}, V_{GS} = 0\ \text{V}$		0.495	0.53	V
		$I_S = 3.0\ \text{A}, V_{GS} = 0\ \text{V}, T_J = 125\text{ }^\circ\text{C}$		0.430	0.47	
<b>Dynamic<sup>a</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 15\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 13\ \text{A}$		37	55	nC
Gate-Source Charge	$Q_{gs}$		10			
Gate-Drain Charge	$Q_{gd}$		8.8			
Gate Resistance	$R_g$			0.8		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\ \text{V}, R_L = 15\ \Omega$ $I_D \cong 1\ \text{A}, V_{GEN} = 10\ \text{V}, R_g = 6\ \Omega$		17	26	ns
Rise Time	$t_r$		14	21		
Turn-Off Delay Time	$t_{d(off)}$		102	155		
Fall Time	$t_f$		26	40		
Source-Drain Reverse Recovery Time	$t_{rr}$		$I_F = 3.0\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$	42	65	

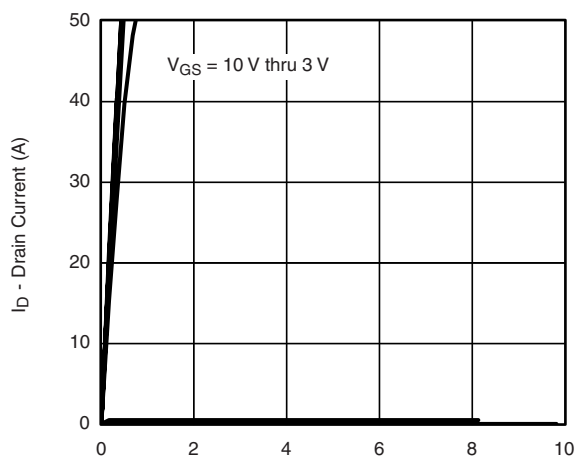
Notes:

a. Guaranteed by design, not subject to production testing.

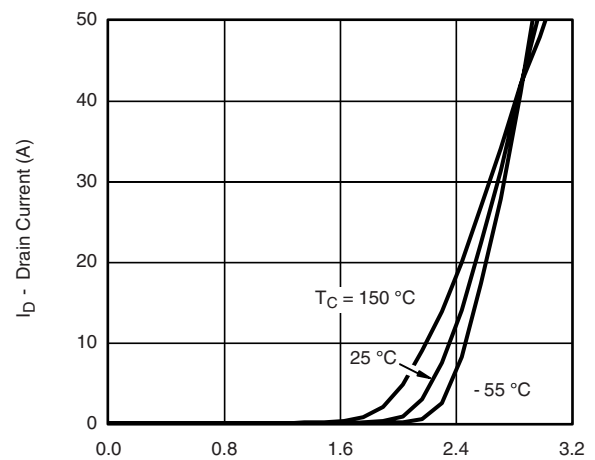
b. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$ unless otherwise noted

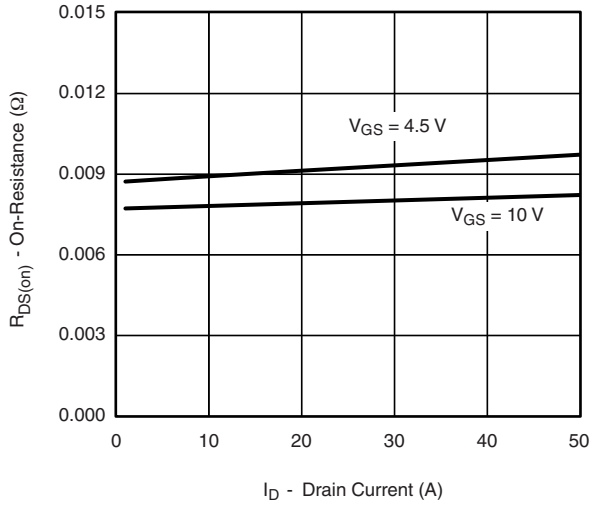


Output Characteristics

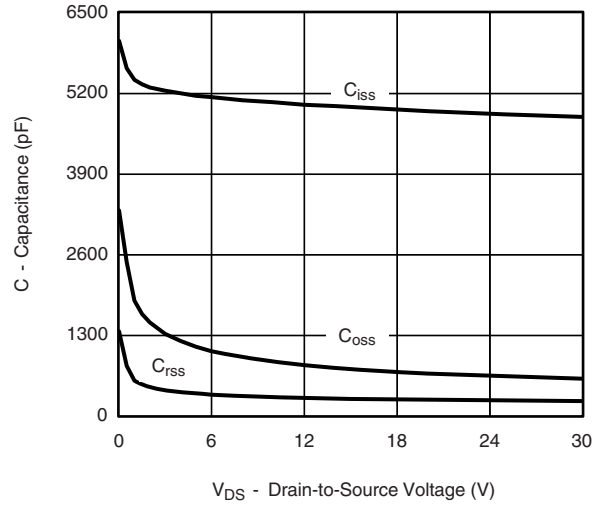


Transfer Characteristics

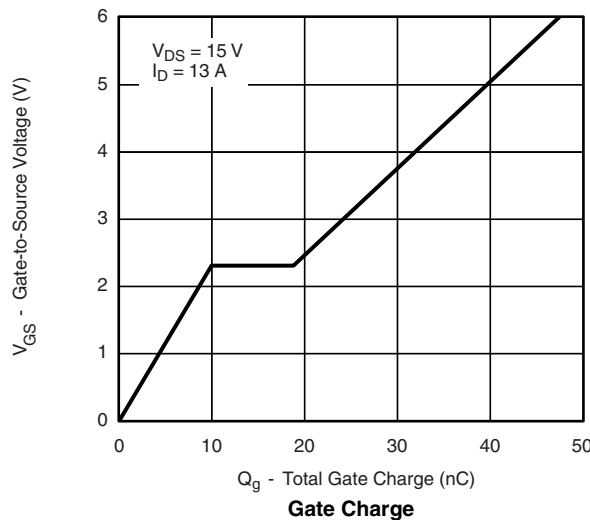
**TYPICAL CHARACTERISTICS** 25 °C unless otherwise noted



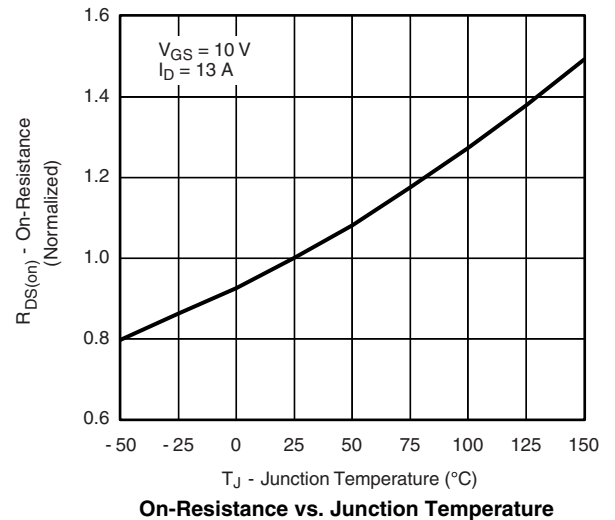
**On-Resistance vs. Drain Current**



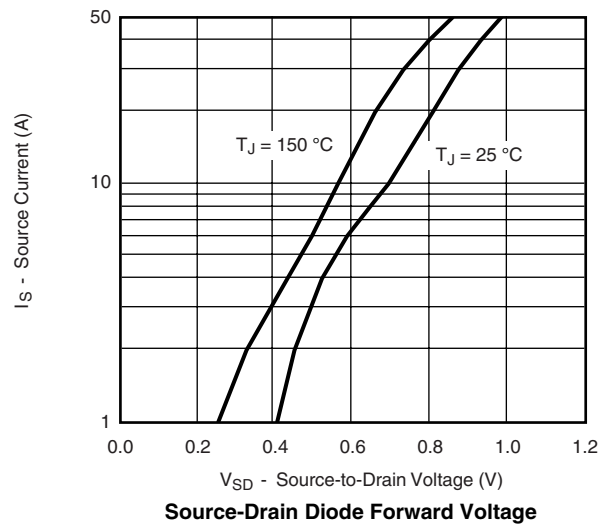
**Capacitance**



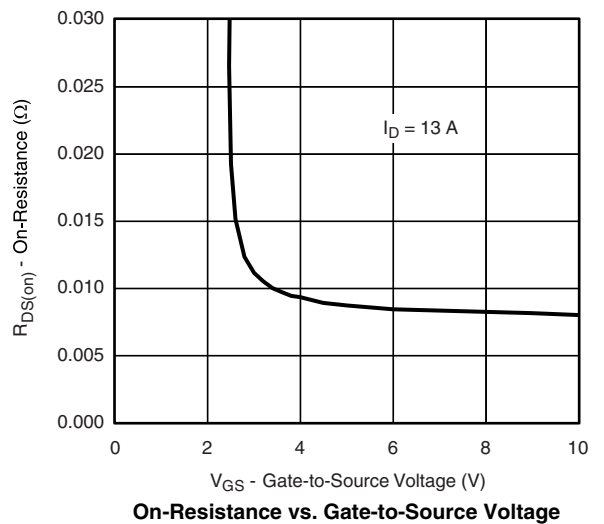
**Gate Charge**



**On-Resistance vs. Junction Temperature**

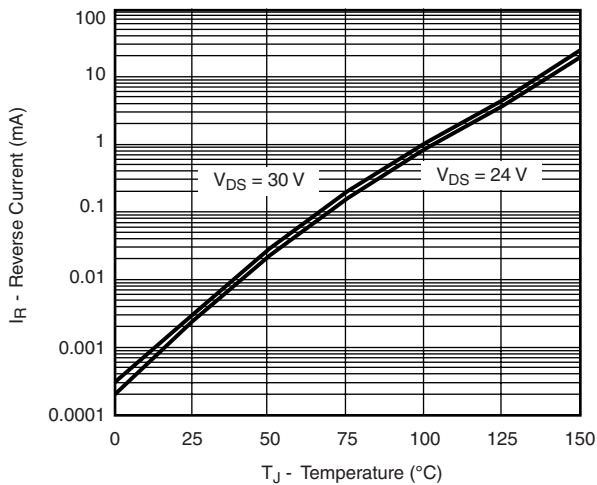


**Source-Drain Diode Forward Voltage**

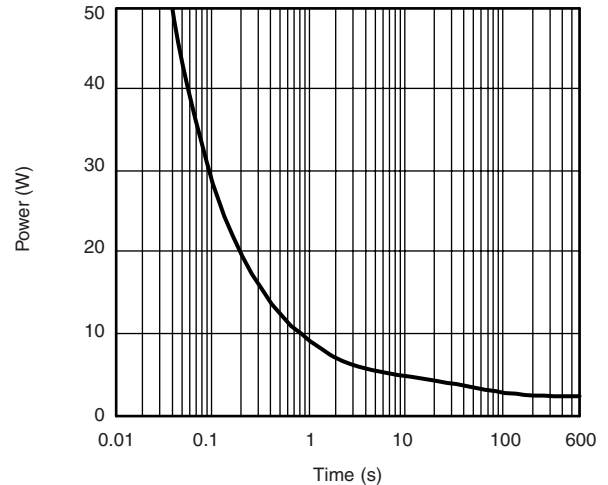


**On-Resistance vs. Gate-to-Source Voltage**

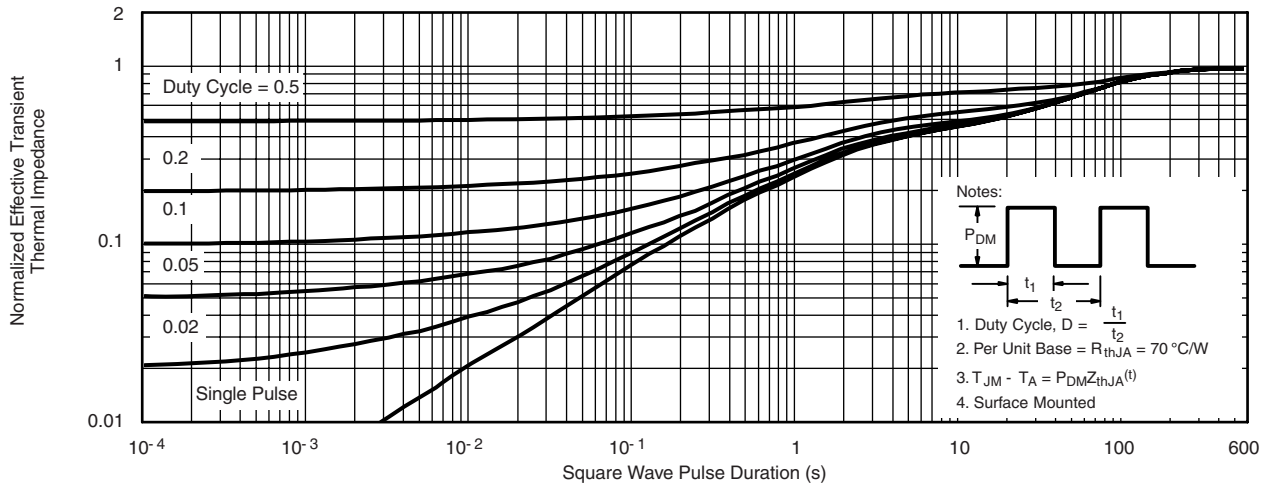
### TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



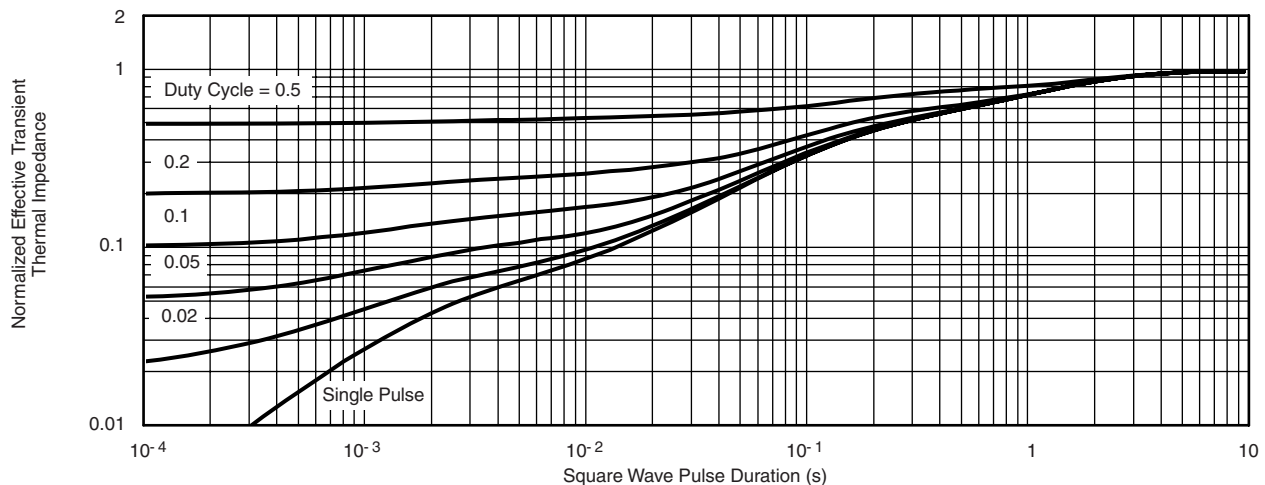
Reverse Current vs. Junction Temperature



Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А